IN 1984-85 A CRITICAL PROBLEM WAS DEFINED AGAIN. THIS TIME IT MUST BE RESOLVED.

The Ontario Cancer Institute incorporating The Princess Margaret Hospital (OCI/PMH) has reached a critical crossroad. One road leads downhill to deterioration, the other uphill to continued excellence. We are determined to stay on the high road!

Each year approximately 7,000 new patients are seen by the staff of The Princess Margaret Hospital. Another 26,000 previously registered patients are also seen, with an annual total of 150,000 daily visits. Because of inadequate facilities to serve such a large number of patients, our goal of excellence has been achieved over the last five to ten years only because of the remarkable dedication of skilled staff who have been prepared to work exceptionally long hours.

This pace cannot continue. We must have assurance from the Ministry of Health that appropriate resources will be immediately forthcoming.

The pace of work is taking a heavy toll on both staff and equipment. It is becoming difficult to attract and hold new physicians. After more than a quarter of a century, equipment breakdowns are frequent among aging radiotherapy machines. Even with extended hours of operation, the number of machines is insufficient to prevent significant delays in starting patients on their treatment. For the patients this creates both potential psychological and physical consequences. For us it generates profound frustration.

This crisis is not a surprise.

In the late 1960s, when just over 4,000 new patients were seen each year, staff predicted the increasing patient numbers and anticipated a potential crisis unless planning for expansion was started immediately.

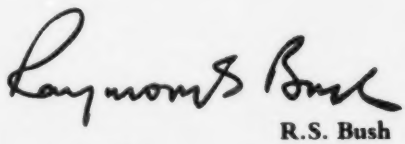
A 1972 role study confirmed those predictions and recommended a two-phase expansion to be completed by 1985. The Ministry of Health agreed to the proposals, yet funds have still not been committed for the second phase. The facilities which were at capacity in the 1970s, are now severely overtaxed.

Faced with this crisis in patient care, the OCI/PMH and the Ontario Cancer Treatment and Research Foundation (OCTRF) jointly commissioned a second study in January 1984 to examine ways in which current and future patient needs can be met within a comprehensive cancer program.

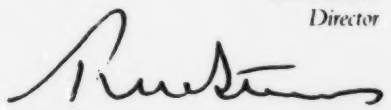
During the past year, while coping with difficult patient loads, medical, scientific and administrative staff have gone through the time-consuming experience of developing a second study which emphasized the predictions made over a decade ago. As the fiscal year ended, the final draft of the report was being prepared for submission to the Boards of the two organizations and the Ministry of Health.

The OCI/PMH has enjoyed an international reputation for excellence in both cancer research and patient care. Patient letters which are featured throughout this Annual Report, reflect the warmth and skill of the staff. Therefore, it is our sincere hope that the recommendations of this new Role Study will be accepted and expedited by the Ministry of Health so that this crisis can be alleviated as quickly as possible and up-to-date facilities provided for the increasing number of cancer patients in Ontario.

Despite our problems the past year has seen a number of distinct and significant achievements some of which are recorded on the following pages.



R.S. Bush
Director



R.W. Stevens
Chairman

MEMBERS OF THE BOARD AND STAFF

"During my frequent visits to my friend, I saw a great deal of tender loving care, mixed with bright spots of good humour and patience. The little 'extras' that you made time for were so important and were much appreciated." M.C.

New Appointment *
Retirement/Resignation **
Deceased ***
Honorary Member ****

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Computer Service
G. Wilkes

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Library
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Nursing Services
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Radiotherapy
A. Kind

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K.K. Williamson

Volunteer Services
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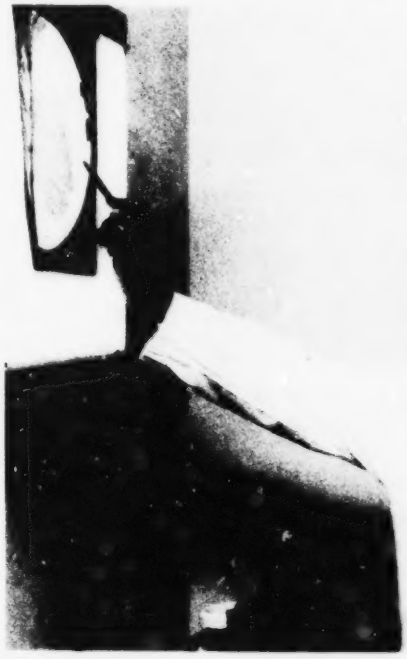
Mrs. E. Sauro *

"I wish to thank you kindly for such wonderful care, courtesy, patience, attention, excellent food, all with a smile. It appears you hire only the finest staff."
M.H.



ROLE STUDY
‡ ASSESSING THE NEEDS OF ONTARIO'S CANCER PATIENTS

"Thank you for the excellent care of our daughter. This care involved the total being, not only the care of the body but also care of the emotions and spirit. Little acts make such a difference!"

To effectively meet patients' needs, hospitals must predict the health care needs of the population and plan well in advance to provide appropriate facilities.

In the late 1960s, when OCI/PMH was the only cancer treatment centre with radiation therapy facilities in the Metro Toronto area, 4,000 new cancer patients came to the OCI/PMH for treatment each year. But staff predicted the number would rise dramatically within a decade.

They were right. In 1981, more than 7,000 patients were treated at OCI/PMH. A second radiotherapy facility, Toronto-Bayview Regional Cancer Centre opened and in 1984-85 the two centres treated a combined total of more than 9,000 patients. Recent studies predict that by the 1990s this figure will rise significantly.

The Ontario Cancer Institute and The Ontario Cancer Treatment and Research Foundation (OCTRF) are jointly responsible for the provision of all radiation therapy services and a large proportion of other cancer services across the province. The first role study commissioned by these two organizations 13 years ago confirmed the expected increase in patients and called for a three-stage expansion of facilities in the Toronto area:

- Phase 1 was the addition of 60 beds and research space at the OCI/PMH,
- Phase 2 was the construction of the Toronto-Bayview Regional Cancer Centre, to be operated by the OCTRF,
- Phase 3 was a major expansion of the OCI/PMH including new radiation therapy facilities to meet the needs of 6,000 new cancer patients each year.

Phases 1 and 2 were completed, but in 1981, Phase 3 was put on indefinite hold by the Ministry of Health even though by this time the PMH was struggling to cope with more than 7,000 patients per year in inadequate facilities.

The OCI/PMH and OCTRF therefore jointly commissioned a second study in 1984 to assess once again the current needs of cancer patients in Ontario and to recommend what steps need to be taken now in light of the current critical situation.

The following highlight some of the problems facing OCI/PMH which are addressed in the role study.

AGED RADIATION THERAPY FACILITIES

Insufficient and aging radiation therapy equipment is one of the many critical and urgent problems addressed by the role study. Staff currently operate machines up to 12 hours per day to provide 86,000 radiation therapy treatments annually. However, frequent breakdowns occur under the strain of such extended hours. Skilled staff work extraordinary hours to keep the equipment in safe working condition.

The complex shielding required for modern high energy machines means that new equipment cannot simply be placed in space used by old equipment; new space has to be built. Interim proposals are being developed, but the problems cannot be solved without a major expansion of the OCI/PMH.

TEMPORARY MEASURES TO HELP MEET PATIENT NEEDS

Because of the urgent radiation therapy requirements, one interim measure was planned during this past year.

It is a "bandaid" step. Without proper expansion it is difficult and costly, but there is no alternative.

The 26-year-old Betatron is being taken out of service during the summer of 1985 and the room renovated to accommodate a new $1.6 million Therac 25. The project is expected to take six months. Patients normally treated on that machine cannot be squeezed into the already tight schedules of other machines and will have to be transported to the Toronto Bayview Regional Cancer Centre for treatment in the interim.

IN SEARCH OF SPACE

An increasing number of staff are gaining "astronaut status" as departments are moved from the main building into "outer space". Currently, eight peripheral buildings accommodate 200 of 1,300 staff members. Some departments are spread over several locations in two buildings. Under these conditions it is difficult to be efficient and maintain good communications.

The acute lack of space also compromises patient dignity. It is distressing to a patient to sit or stand in a crowded public corridor and wait for various tests and examinations.

A PERCEPTIVE PATIENT ECHOES THE CONCERNS OF ALL STAFF . . .

"The hospital visit was all that I . . . had expected it to be. The staff members who looked after me from the floor cleaners to the head nurse were uniformly cheerful, attentive and businesslike and quite obviously superior, in attitude at least, to the staff of several other hospitals I have been a patient in during the past six months.

. . . I was, therefore, surprised and disappointed to find the equipment to be antiquated and apparently a regular sufferer from breakdown problems.

. . . I ask "why is it that with the millions of dollars we are led to believe are available on an annual basis for cancer projects, that Canada's leading cancer hospital limps along with archaic equipment?" "

J.T.D.

MOVING AHEAD AGAINST THE ODDS

"This is a splendid facility. Well managed, good program. All staff I have met are dedicated, friendly, sensitive to the needs of patients and supportive. All this is reflected in the morale of most patients." G.M.

Despite severe physical constraints, the primary goal of OCI/PMH staff will always be to provide superior patient care.

One of the ways to achieve an atmosphere in which quality patient care can flourish is to develop well-organized and capable leadership at the department head and administrative levels.

Great strides were made by all department heads during the past year as they worked together towards meeting accreditation standards and developing a hospital-wide quality assurance program.

ACCREDITATION

Accreditation is a voluntary review of hospital practices and procedures by the Canadian Council on Hospital Accreditation. This organization, in conjunction with other health care organizations, has developed standards by which health care facilities can evaluate and document the efficiency and effectiveness of their organization.

As a hospital dedicated exclusively to the care of cancer patients, The Princess Margaret Hospital has never participated in this process. However, the Board recognizes that although the Hospital's type of care is unique, the methods of providing care are in many ways similar to the methods in general hospitals. They also recognize that department heads could benefit from the collective experience of hospitals across the country.

During the past year, all department heads and administration have been reviewing the accreditation standards, and developing and revising policies and procedures in keeping with these guidelines.

A mission statement has been drafted, bylaws reviewed, and administrative and departmental manuals developed in preparation for a first accreditation survey in the fall of 1985.

QUALITY ASSURANCE

An important part of a well-managed organization is a co-ordinated, hospital-wide system of quality assurance. Hospitals across the province are currently developing and sharing information about quality assurance programs.

Many departments, such as Nursing, already have well-defined programs to audit and measure performance standards. During the past year, a Quality Assurance Committee was established to develop a way of co-ordinating these departmental programs into a hospital-wide program to ensure that the Board and all departments work together setting, meeting and reviewing standards of care.

PERFORMANCE APPRAISAL

At the heart of a good hospital are caring, skilled staff. Through a good performance appraisal system staff are recognized for their strengths and encouraged to improve their weaknesses. Performance appraisal is also an important component of a good quality assurance program.

During the past year, a committee composed of representatives from a variety of departments including Personnel, developed a comprehensive set of guidelines to help department heads provide consistent and thorough reviews of employee performance.

Department heads also attended a workshop to develop skills in interviewing and reviewing employees, and to introduce the new system of performance appraisal.

HIGHLIGHTS OF A YEAR OF CHALLENGE AND ACHIEVEMENT

INTERFERON HELPS PATIENT WITH RARE FORM OF LEUKEMIA

Sven Siems knows what it is like to enjoy life again. During the past year he has taken two trips abroad and can run up the stairs again.

Just a year and a half ago, Mr. Siems was suffering the complications of a rare form of chronic leukemia called Hairy Cell Leukemia which is marked by severe bone marrow failure. There was, until recently, no known treatment. Antibiotics were used to treat the life-threatening infections, and transfusions every few weeks helped patients combat anemia and bleeding.

"I was always tired and was subject to infections," he said. "When I walked up six steps, I would be exhausted and I had to stop."

At The Princess Margaret Hospital doctors decided to try a new treatment, interferon. Mr. Siems is one of the lucky patients. The results have been remarkable.

He is back at work with a perfect attendance record and he no longer needs blood transfusions. He also has the energy to take the stairs.

Hairy Cell Leukemia is a very rare form of leukemia and the interferon is not a treatment for all forms of leukemia or even for all patients with this rare form. This is, however, an example of the steady progress which continues to be made in the treatment of patients with cancer.

IMPROVED SUCCESS RATE FOR CANCER OF THE TESTES

Since 1977, the long term disease-free survival of young men with carcinoma of the testes has risen from 50 per cent to an encouraging 88.7 per cent.

Prior to 1977, carcinomas of the testes were the most common form of cancer causing death in young men. That year the clinical staff at The Princess Margaret Hospital introduced a new treatment policy for non-seminomatous tumours, combining surgery, irradiation and combination chemotherapy. Staff have now treated 248 patients and 220 continue to enjoy life.

The improved results are attributed to the introduction of effective combination chemotherapy and the close collaboration of urologists, and radiation and medical oncologists in the management of patients with this complex, but potentially curable disease.

UNIQUE DENTAL CLINIC IMPROVES RECOVERY OF PATIENTS AFTER CANCER TREATMENT

The mouth is a prime source of irritation and potential infection for patients recovering from chemotherapy and radiation therapy. However a unique dental clinic at OCI/PMH is proving highly effective in reducing post-treatment complications.

Sven Siems (photo below), is enjoying health and vigour after the successful treatment of his rare form of leukemia. He is back at work with a perfect attendance record and no longer needs blood transfusions. He also has the energy to take the stairs.

"We have found all members of your staff so kind considerate and thoughtful. The volunteers made our first visit very comfortable. They deserve so much credit. they make a fearful time almost pleasant!"
S.&M.B.

"I think this is the friendliest hospital I have been in. The staff explain everything that is to be done and they bend over backwards to make you feel at ease."

All bone marrow transplant patients, most leukemia patients and all patients receiving head and neck radiation are carefully screened and treated by a specialized dental team prior to treatment to eliminate any dental complications. During treatment, screening is continued to catch any problems in the early stages. Patients are taught special hygiene to cope with the oral dryness and tenderness that can occur.

The dental team has also developed an outstanding reputation as the only centre in the province for fitting complex maxillo-facial prosthetics. Patients undergoing removal of facial bones because of cancer usually require a nasal-gastric feeding tube for several weeks while the tissues heal.

At the OCI/PMH a facial splint is made prior to surgery and wired in place during the operation. The splint covers gaps in the patient's upper or lower jaw, supports surrounding facial structures and allows the patient to eat normally soon after surgery. The patient is able to go home much sooner and is better able to adjust emotionally to his treatment.

When the tissues have healed, the patient returns to OCI/PMH for a permanent prosthesis.

This dental program has proved so successful in the management of patients with cancer, that during the past year, the clinic expanded to five days per week.

150TH BONE MARROW TRANSPLANT

A milestone was reached this year in the Bone Marrow Transplant (BMT) program when the 150th transplant patient went home to his family in record time.

Since the BMT program began in 1970, transplants have been performed primarily for aplastic anemia, acute myeloid leukemia, and chronic myeloid leukemia. The unit has 12 beds and on average, one transplant is performed per week.

Through integrated clinical and laboratory research, both treatments and the life expectancy of patients have improved. Since 1979, 108 patients with acute and chronic leukemia have received tranplants. All such patients would be expected to die of their disease. But overall, 55 per cent have achieved disease-free survival with a median follow-up of 28 months.

Although younger patients and individuals with stable disease have the best chance of prolonged survival, the main difficulties continue to be graft-versus-host disease (GvHD) and associated infectious complications. A clinical pilot study using Cyclosporine A to combat GvHD is nearing completion and the results appear promising. The proportion of patients surviving the first three months post-transplant has increased from 70 to 85 per cent.

PRESERVING APPEARANCE AND FUNCTION THROUGH RADIATION THERAPY

In the early days of cancer treatment when mortality rates were high, quality of life was frequently sacrificed in the search for longer life. Cutting out or off the diseased and surrounding tissue was often the most effective treatment, but the patient was left to cope with disfiguring scars or loss of function.

It is only recently that quality of life has become an important consideration in searching for the optimal treatment for different types of cancer. Doctors are now also more concerned with preserving the appearance and/or function of the affected area if it can be shown that an alternate treatment can provide a similar or better survival rate.

Radiation therapy plays an important role in achieving this goal. Ionizing radiation can kill both normal and malignant cells, but malignant cells tend to be more sensitive to radiation. Therefore by delivering precisely measured radiation doses over several days, malignant cells can be destroyed and the damage to surrounding normal tissue minimized.

PRESERVING THE EYE AND ITS APPEARANCE

Just a little over a decade ago, only 50 per cent of patients with eye tumours lived more than five years and the standard treatment was removal of the eye.

Now about 84 per cent of patients have a five year survival and most retain their vision.

Radiation oncologists at OCI/PMH have tested two methods of giving radiation therapy to eye tumours. One involves careful shielding of sensitive eye structures and directing a fine beam of radiation through the side of the skull to the back of the eye.

The other technique involves temporarily inserting a tiny plaque containing radioactive seeds into the eye. Both techniques have resulted in improved survival rates for the patient, preserved appearance, and extended the useful life of the eye.

Unfortunately, the radiation can cause damage to the retina (back of the eye) and some patients may lose vision in the treated eye after a few years.

Other centres have become interested in the success of the work done here and a North American trial is planned for next year if the grant is awarded.

If the tumour is restricted to the eyelid and does not involve the eye itself, between 93 and 95 per cent of patients receiving radiation therapy alone are still tumour-free after five years. This treatment produces excellent results in both preserving life and preserving the patient's appearance.

PRESERVING THE GIFT OF SPEECH

Surgery is an effective cure for cancer of the larynx, but the resulting loss of speech can be a frustrating handicap for the patient and his family. Quality of life studies show that fewer than half are able to keep their job. For these patients, keeping their voice and being cured is the goal.

At the OCI/PMH, approximately 200 patients with cancer of the larynx are assessed each year by both radiation oncologists and surgeons specializing in cancer of the head and neck. All patients receive radiation therapy first. If a biopsy shows any tumour still present after three months, then surgery is performed.

Results of the OCI/PMH study showed that among a group of patients who were diagnosed early, 94 per cent required only radiation therapy and were considered cured after five years. The other six per cent were cured by subsequent removal of the larynx.

RADIATION AND CHEMOTHERAPY REDUCE THE NEED FOR COLOSTOMY FOR PATIENTS WITH ANAL CANAL CARCINOMA

Cancer of the anal canal only affects about one in 100,000 persons, but for those individuals, remarkable improvements in treatment have been developed at OCI/PMH.

Radiation therapy alone has been the standard treatment at OCI/PMH for two decades. Surgery and creation of a colostomy (an artificial opening in the abdomen wall for

"My sincere thanks ... to the wonderful, cheerful nurses of this staff, to the dedicated technicians on Theratron 1, radiation department and the nurses and aides who I got to know so well, my deepest and sincere gratitude for saving my voice." J.J.S.

"On a scale of 1 to 10 the two ladies in the Magnetic Resonance Imaging section get a 10. They were marvellous. One explained in excellent detail exactly what was going to happen, and gave me interesting and assuring information about the machine. The technician was the epitome of patience and thoughtfulness and did her utmost to make me comfortable. She seemed to know that old bones get tired."

eliminating solid body wastes) have been reserved for those patients who did not respond to radiation therapy.

In recent years, the radiation therapy was combined with chemotherapy. The results have been surprisingly effective and were published last year. With the combined treatment, the number of patients needing subsequent surgery to create a colostomy, dropped from 40 to 10 per cent. Overall, about 70 per cent of patients treated for cancer of the anus are alive after 5 years.

CONSERVATIVE MANAGEMENT OF BREAST CANCER

The conservative management of breast cancer has received publicity in recent years. There is still widespread controversy about the most effective treatment, but the OCI/PMH is a leader in the attempt to improve survival rates while preserving appearance.

More than 1,000 new patients with breast cancer are seen at OCI/PMH each year and several clinical studies are underway.

So far the majority of patients have been treated by surgical removal of the tumour and a small amount of surrounding tissue. The axillary nodes are also sampled to determine whether there are metastases present, and the majority of patients received post-operative radiation therapy.

The relative survival rates (corrected for age) are 83 per cent at five years and 70 per cent at 10 years. Post-operative radiation therapy did not appear to improve the results. These figures compare favourably with the reported survival rates following radical mastectomy. Therefore, the goal now is to define the minimum optimal treatment that will not be detrimental to survival.

However breast cancer is a complex disease which continues to be the leading cause of death in women age 35 to 54 years.

PATIENT EDUCATION

For the newly diagnosed cancer patient and his family, the overwhelming amount of new information and instructions can sometimes be difficult to understand and remember. It is often helpful to a patient to be able to review the information at a later time, in a quiet place and at his own speed.

The Patient Education Committee is working with different departments to develop informative, take-home pamphlets to complement discussions between staff and patients about tests, treatments and self-care.

The Committee believes that education is very important in helping the patient and his family understand the disease, adjust their lifestyle and comfortably make those decisions which will be left up to them.

Members of this multi-disciplinary Committee carefully review all proposed pamphlets and pre-test them with patients to ensure accuracy, sensitivity and effectiveness.

During the past year, the committee also developed a comprehensive catalogue of patient education aids to encourage staff to use available resources. Unfortunately a proposed patient resource centre with books, pamphlets and videotapes is on indefinite hold due to the current shortage of space in the main hospital.

ELECTRON MICROSCOPE NOW BEING PRODUCED FOR WORLDWIDE SALES

After more than 15 years of research, an electron microscope developed at the OCI/PMH by Dr. Peter Ottensmeyer is now being commercially manufactured for use in research and clinical labs around the world.

The technology developed by Dr. Ottensmeyer represents a major advancement in this field. The new microscope provides a much clearer and sharper image than was previously possible. The microscope can also identify the type and location of atoms in the picture.

This microscope is an excellent example of how an instrument developed to assist in cancer research is now benefiting patients as well as scientists in other areas of research. It

has, for example, proved to be of great value in examining metallurgical samples and elements used in the semi-conductor industry.

To make this valuble technology available to others around the world, the OCI/PMH entered into an agreement with Carl Zeiss of West Germany, a renowned maker of fine scientific and industrial instruments, to produce a commercial version. This year Zeiss presented the first production model of the EM902 to the OCI/PMH Pathology Department to assist them in the diagnosis of patients with cancer.

MAGNETIC RESONANCE IMAGING PROVES ITSELF AS A CLINICAL TOOL

Magnetic resonance imaging (MRI) is rapidly evolving in the 1980s as a new diagnostic imaging technique with great promise. Research into this field has advanced so rapidly, that during this past year, OCI/PMH staff demonstrated that MRI was ready to make the important transition from being a research tool to being a clinical diagnostic modality for patients. During the year, 1200 patients were seen here some of whom were sent from other hospitals to take advantage of the unique properties of this machine.

The OCI/PMH was fortunate to be selected by the Ministry of Health as the first centre in Ontario to receive this prototype machine for research. MRI produces an image through any plane of the body. It is similar to the image obtained from a CT scan, (computerized axial tomography scan) but MRI does not use x-rays or any form of radioactivity. Instead, the patient is placed in the centre of a large circular magnet. Signals from radiofrequency pulses are measured by a computer and used to generate a black and white image on a screen. There is no known risk to the patient.

The most exciting aspect of MRI is that the limits of this technology are not yet known. Images from these early MRI machines are already comparable to CT images in many applications. But scientists know that with further development of MRI machines they will be able to obtain increasingly precise tissue information. Research at OCI has focussed on the use of MRI in detecting cancer in soft tissue. However, in the process, the scientists have discovered important uses of MRI for other branches of medicine.

MRI is now considered the best imaging method available for the base of the brain and the spine. Bone interferes with most imaging techniques, but to MRI, bone is invisible. The tissues hidden behind bony structures become clearly visible. This could soon eliminate the need for the potentially hazardous injection of dye now needed to outline the spinal cord for traditional x-rays.

SCANNING FOR BREAST TUMOURS WITH ULTRASOUND

While one team of scientists is studying the use of magnetic resonance to create images of

After 15 years of research, the first production model of an electron microscope developed at OCI/PMH was presented to the OCI Pathology Department for clinical use. Dr. R. Bush (left), and Dr. P. Ottensmeyer (centre), are shown accepting the EM902 from Dr. D. Kurz of Carl Zeiss, West Germany.

"Being a patient at your hospital under such professional people has helped me to understand the meaning of cancer. Everyone has been so kind to me... The nurses, kind helpful and caring. Blood bank ... always answered my questions... Radiation therapy nurses ... all x-ray staff — gentle and kind. Parking attendant — always made my visits a little easier with his happy "Good Morning. How are you today?" ... My hat is off to your staff, you have a great hospital ... My thanks to you all." P.D.

internal body structures, another team is investigating the use of ultrasound, or high frequency sound waves as a diagnostic imaging tool.

The ultrasound group is specializing in the design and development of an ultrasound breast scanner. With the help of physicians at Princess Margaret Hospital and Women's College Hospital, the team is evaluating the ability of this scanner to detect abnormalities of the breast. More than 950 women have been examined using both the new ultrasound and traditional x-ray mammography

Medical ultrasonic imaging is very similar to the "sonar" systems used for underwater navigation. Short bursts of high frequency sound waves are pulsed through the body. These sound waves reflect in different ways off different body structures. With the help of a computer, these reflected waves or "echos" are analysed and constructed into a picture. As in magnetic resonance imaging, there is no known risk to the patient from ultrasound.

So far, it appears that ultrasound has unique abilities in young patients with dense breasts, while the x-ray mammography is more accurate for patients with fatty breasts. However, the two systems complement each other since some tumours and cysts detected by ultrasound were not observed by x-ray mammography and vice versa.

EXPLORING WHY SOME CANCER CELLS BECOME RESISTANT TO THE EFFECTS OF DRUGS

Chemotherapy is important in cancer treatment. Sometimes, as in Hodgkin's disease, it is highly effective. Unfortunately, when common solid tumours spread, they eventually fail to respond to drug treatment. The reason for failure is clearly an important problem for research. One possible explanation is that during the course of the disease, cancer cells become resistant to the effects of drugs.

Dr. Victor Ling has made important discoveries in the field of resistance of cancer cells to chemotherapy. He found that a certain protein (p-glycoprotein) was increased quantitatively on the surfaces of cancer cells resistant to a variety of chemotherapeutic agents. He has provided evidence that cells may become resistant by increasing their p-glycoprotein production.

During the past year, Dr. Ling and his co-workers have made two major advances. First, they were able to produce monoclonal antibodies against p-glycoprotein. Then, using the antibodies as tools, the group obtain molecular clones for genes coding for p-glycoprotein.

Both discoveries have already yielded new knowledge. The monoclonal antibody has been used to show that p-glycoprotein may be present in cells freshly obtained from cancer patients. This finding increases the probability that p-glycoprotein may contribute to clinical drug resistance.

The molecular clones have been used as probes to examine DNA from tumour cells. These experiments showed that a gene family, rather than a single gene, may be encoded for p-glycoprotein. This observation raises the interesting possibility that different but related p-glycoproteins may be involved in generating the complex multi-drug resistance of cancer cells.

UNLOCKING THE SECRETS OF T CELL RECEPTORS

Two years ago, Dr. Tak Mak and his research team were the first to isolate a molecular clone for the β-chain of the receptor on T lymphocytes. These blood cells play an essential role in immunity; the receptor is the structure that permits them to recognize viruses or foreign cells as a first step in reaction to them.

Since the original discovery, and particularly in the last year, Dr. Mak has exploited and extended his observations. He has isolated clones coding for the α-chain, and determined its nucleotide sequence. Of

great importance he has been able to reconstitute biologically active T cell receptors by transfecting the appropriate clones into non-lymphoid cells. This finding provides proof for the hypothesis that the T cell receptor is an α-β heterodimer and that the molecular clones encode for it.

NEW "GENE MACHINE" FOR BIOLOGICAL RESEARCH

Modern cancer research depends on technology. Rapid advances are dependent on analysis and synthesis of the major molecules within cells. These include the building blocks (nucleotides) of information-encoding DNA or RNA and the amino acids of which proteins are constructed. The last year has seen a marked increase in our capacity to work competitively in this rapidly moving field. The Institute has obtained two machines which build chains of nucleotides or amino acids in specified order. In addition, new apparatus was acquired that permits the rapid purification of the newly synthesized molecules. With this facility, scientists at the OCI will be able to prepare artificial genes. These will be used to compare the genetic compositions of normal and cancerous cells. By introducing changes into genes, scientists can detect the effects of many mutations, including those important in cancer.

Using amino acids, artificial peptides (small proteins) can be manufactured. These can serve as highly specific antigens. Antibodies produced against them can be used to identify precise cellular components. In the future, proteins may be engineered for use in raising antibodies of such high cancer specificity that they can be effective in treatment.

These new research facilities are considered part of a city-wide biotechnology network. Other University of Toronto affiliated departments or hospitals are acquiring complementary apparatus. Through a joint users committee the whole research community will benefit. OCI participation in this network reflects the policy of working cooperatively within the Metro Toronto region.

TERRY FOX FELLOWSHIP PROGRAM PRAISED FOR ITS SUCCESS

The Terry Fox Fellowship program at the OCI/PMH has been praised as one of the most successful in the country. During this past year, nine Fellows worked in the research labs under the supervision of senior staff. Some of the Fellows are Ph.Ds pursuing cancer-related postdoctoral work while others are medical doctors who are spending one or two years on research projects related to cancer.

A team from the National Cancer Institute reviewed the program at OCI/PMH and in their report wrote: "Dr. Till and his colleagues are to be congratulated on their success. The large cadre of excellent mentors and associate colleagues represent an ideal milieu for those fortunate enough to be awarded a fellowship."

Dr. Vic Ling, shown here working in his lab, has made important discoveries in learning why some cancer cells become resistant to the effects of drugs. See the story on page 12.

DONATIONS

"I have sent a contribution to P.M.H. Trust. Thank you for sharing and caring for me and thousands of other folks. I greatly appreciate your personal involvement in the fight to overcome cancer."

The operations of The Princess Margaret Hospital, which is incorporated in The Ontario Cancer Institute, are financed similarly to those of other public hospitals in Ontario, with the exception that additional funds are received from The Ontario Cancer Treatment and Research Foundation.

Basic support for the clinical and fundamental research carried out at The Ontario Cancer Institute is provided by The Ontario Cancer Treatment and Research Foundation and the Province of Ontario. In addition, research grants, contracts, fellowships and scholarships from the following sources have provided the further support necessary for research programs:

Banting Research Foundation
J.P. Bickell Foundation
Bristol Myers Company
Canadian Cancer Society — Gordon Richards Fellowship
Crusade Against Leukemia
Cyanamid Canada Inc.
Hoffman La-Roche Ltd.
IMREG Inc.
Janssen Pharmaceutica Inc.
Leukemia Research Fund
McGill University
Medical Research Council
Ministry of Colleges & Universities
Ministry of National Health & Welfare
National Cancer Institute of Canada
National Cancer Institute, National Institutes of Health (U.S.A.)
Natural Sciences & Engineering Research Council of Canada
Ontario Cancer Treatment & Research Foundation
Harold E. Johns Graduate Fellowships
Ivan H. Smith Memorial Studentships
Ontario Ministry of Health (Provincial Health Research Grants)
Queen's University
T Cell Sciences Inc.
Technicare Corporation
University of Toronto
The Upjohn Company of Canada
Warner Lambert Ltd
World Health Organization

Also, our research and clinical activities are assisted by bequests and donations to the PMH Trust. We wish to acknowledge the following bequests and donations to the PMH Trust during the past year.

BEQUESTS FROM THE ESTATES OF THE LATE:
Jessie Bonham
Christine L. Christie
Gordon G. Cosens
Catherine Cruse
Leon V. Goldberg
Greta Hutley
Margaret Innes
Connie E.F. Leslie
Edith M. McCuaig
Jean McKenzie
Donald H. Neale
Anne C. Robertson
William R. Scott
Margaret Threlfall
Eleanor M. Trager
Zella R.E. Welsh
Kenneth G. Wood

DONATIONS IN MEMORY OF:
Paolo Ardizzi
Dorothea Ahiers
H.W.E. Blaire
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Clara Carrington
Joan Chivers
Tom Cross
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Norm Williamson

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Mr. & Mrs. K. Treziakiewicz
Mrs. Y. Vetere
Mrs. L. Webber
Miss N. Weir
Miss Katherine Williams
Mr. & Mrs. L.H. Williams

Substantial donations received to honour the 50th birthday of Mr. M. Silver.

Josl Huter was one of the first cancer patients treated at OCI/PMH. Today he is healthy and the owner of Mount St. Louis Moonstone Ski Resort. A ski day at the resort this past winter raised more than $4,000 for the PMH Trust.

AWARDS & HONOURS

Bergsagel DE. The Jeffrey A. Gottlieb Memorial Award of Texas System Cancer Center, University of Texas. M.D. Anderson Hospital and Tumor Institute, November, 1984.

Bush RS. Finzi Lecturer. The Royal Society of Medicine, London, England, April, 1984.

Bush RS. Honorary Membership, European Society for Therapeutic Radiology and Oncology. Stockholm, Sweden, June, 1985.

Cunningham AJ. Ontario Bicentennial Medal, 1984. Awarded by the office of the Premier of Ontario for service to the community through work with evening classes for cancer patients.

Cunningham AJ. Ontario Psychological Association Award, 1985. Awarded for the most innovative clinical program bringing clinical psychology to the people and the community.

Fitzpatrick PJ. Testimonial dinner and award. Laurentian Hospital. Sudbury, Ontario, December, 1984.

Foster FS. Ultrasound in Medicine and Biology Prize. 1984.

Hozumi N. Boehringer Manheim Canada Prize. Canadian Biochemical Society, 1984.

Mak TW. The Outstanding Award of the Year. Chinese Cultural Association of Canada, 1984.

Mak TW. E.W.R. Steacie Award. Natural Sciences and Engineering Research Council, Ottawa, 1985.

Mak TW. Ayerst Award. Canadian Biochemical Society, 1985.

Minden MD. Scholar, Leukemia Society of America, 1984.

Rawlinson JA, Bielajew AF, Munro P, Galbraith DM. The Farrington Daniels Award for the best paper on an aspect of radiation dosimetry published in medical physics in the year 1984.

Till JE. University Professor. University of Toronto, Toronto, Ontario, 1984.

Yaffe MJ. Charles E. Ives Engineering Award. Presented by the Society of Photographic Scientists and Engineers, 1984.

Yaffe MJ. Sylvia Greenfield Award. Presented to P. Johns and M. Yaffe by American Association of Physicists in Medicine, July, 1984.

The prestigious E.W.R. Steacie Award was presented to Dr. T.W. Mak by Governor General Jeanne Sauvé at a ceremony in Ottawa.

STATISTICS

TABLE 1

New patients referred to the Princess Margaret Hospital by county or district of residence

APRIL 1984 - MARCH 1985

Malignant & Non-Malignant

Total Ontario	1720
Total Outside Ontario	105
Total Outside Canada	71
TOTAL:	**1896**

TABLE II APRIL 1984 - MARCH 1985

Cases of malignant disease — Distribution by site of malignancy and sex

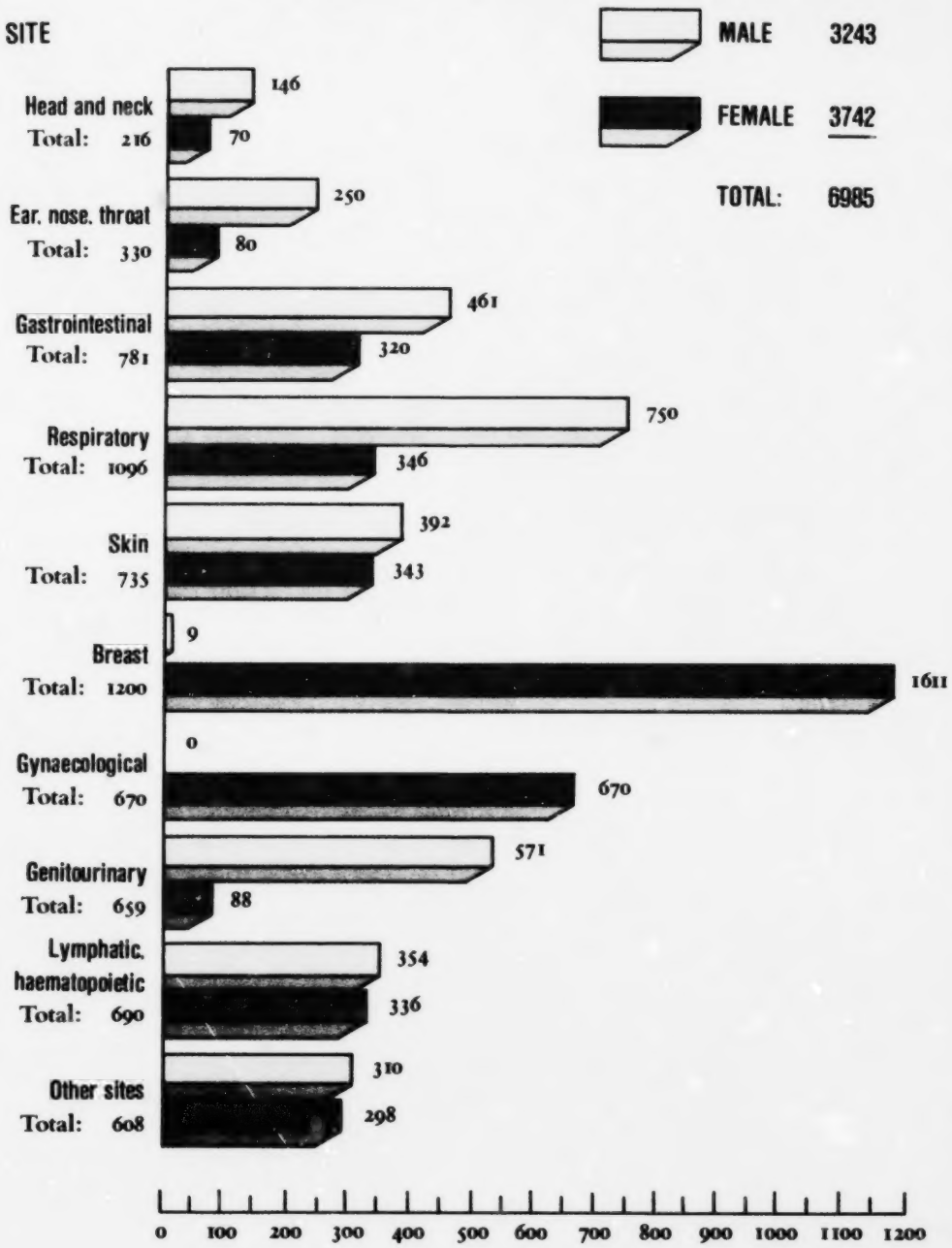


TABLE III APRIL 1984 - MARCH 1985
New patients with malignant disease — distribution by age and sex

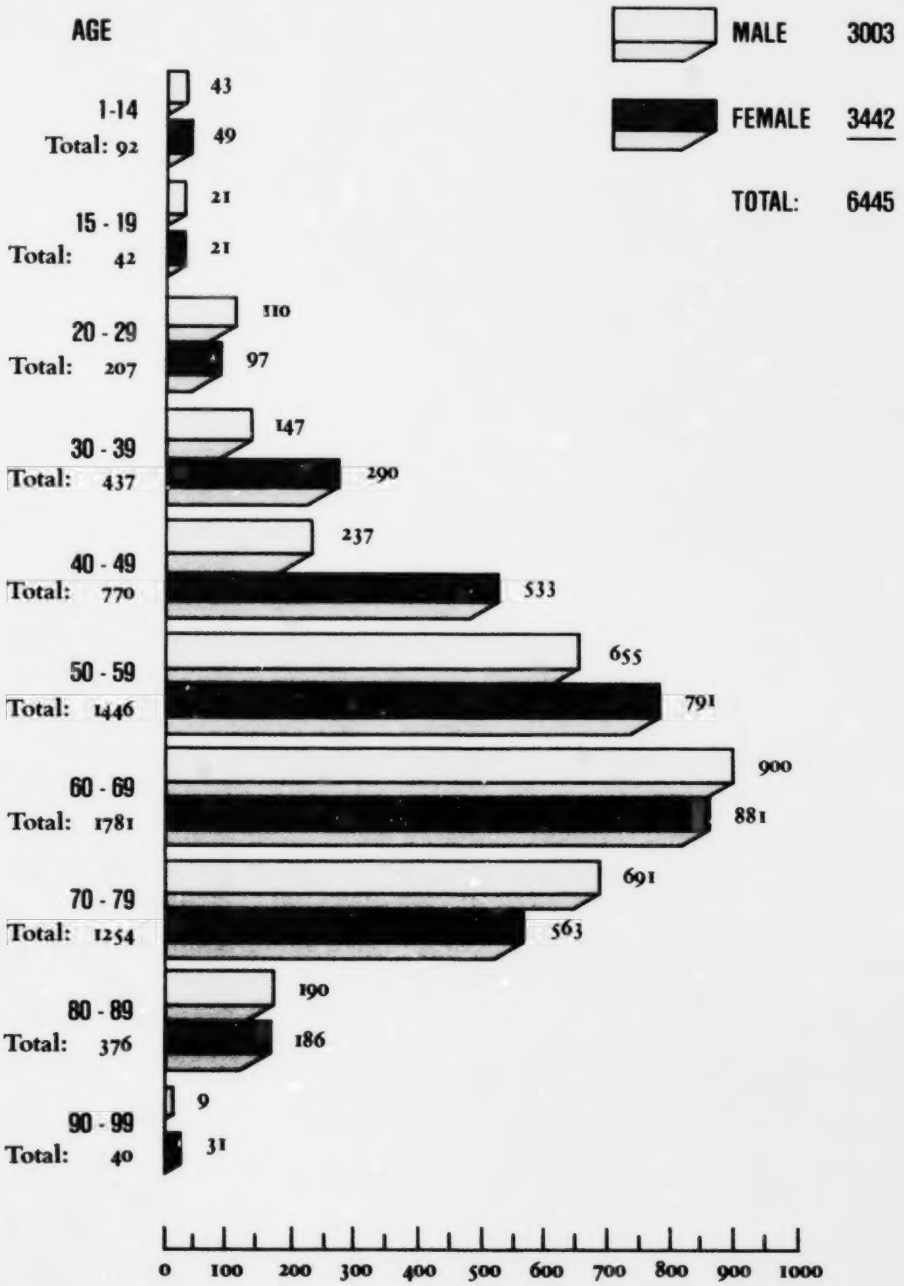
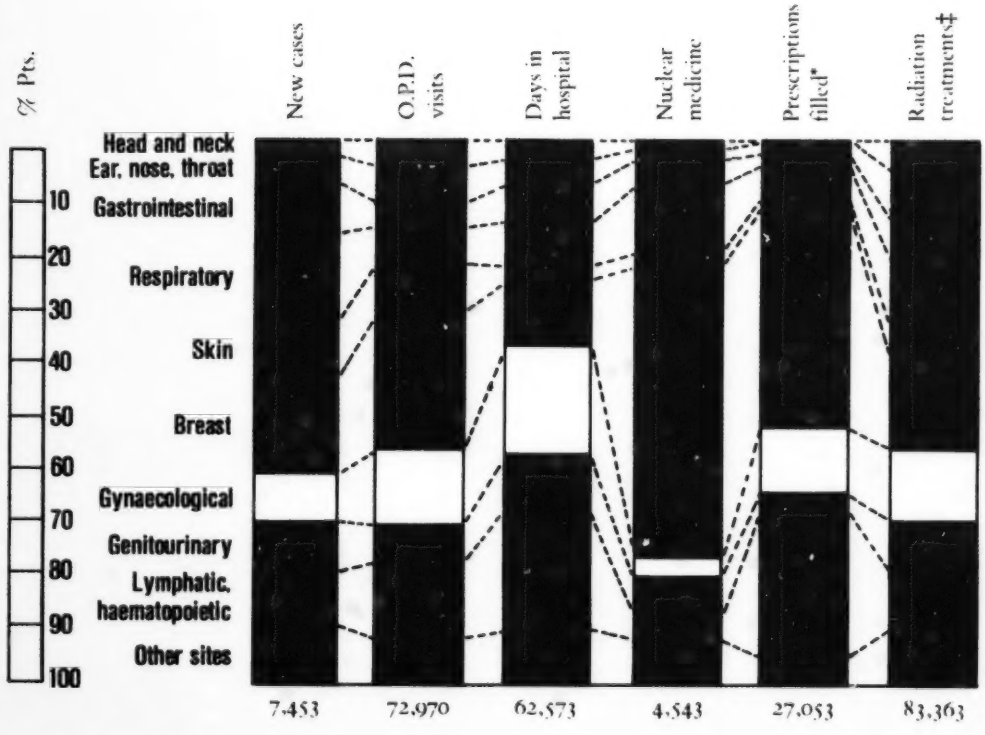


TABLE IV APRIL 1984 - MARCH 1985

Hospital Workload by Site of Disease

(Percentage of Workload)



**Chemotherapy only*

‡*External beam only*

TABLE V APRIL 1984 - MARCH 1985
Number of Treatments Given in the Department of Radiotherapy

EXTERNAL BEAM	
Superficial x-ray	1,856
Deep x-ray	3,136
Cobalt	41,210
Linear accelerators:	
• Low energy	8,628
• High energy	23,612
Betatron	4,921
Total	**83,363**
Inpatient treatments	15,724
Outpatient treatments	67,639
Total	**83,363**
SEALED SOURCES	
Intracavity	251
Interstitial (needles, wires & seeds)	46
Strontium applicators	101
Total	**398**

TABLE VI APRIL 1984 - MARCH 1985
Services at Peripheral Clinics

	NEW PATIENTS SEEN		PERIPHERAL CLINIC VISITS*	
CLINIC	**MALIGNANT**	**OTHER**	**MALIGNANT**	**OTHER**
North Bay	135	19	1322	65
Owen Sound	89	3	732	15
Peterborough	38	1	1839	32
Sault Ste. Marie	34	0	746	11
Sudbury	17	1	1258	13
Timmins	34	7	1027	38
Total†	**347**	**31**	**6924**	**174**

**Including the visits when patients are first seen at peripheral clinics, as well as subsequent visits for new and old patients.*

†In addition, 182 patients were registered at the Sudbury Oncology Clinic, as distinct from the Sudbury Peripheral Clinic, and seen by Dr. R. Corringham. They had a total of 2274 visits. Eighty-four of these patients are omitted from the other tables because their records were not yet indexed.

THE ONTARIO CANCER INSTITUTE
FINANCIAL STATEMENTS
MARCH 31, 1985

BALANCE SHEET
MARCH 31, 1985

(with comparative figures as at March 31, 1984)

ASSETS	1985	1984
CURRENT:		
Cash	$ 2,439,185	$ 3,182,937
Short-term investments, at cost including accrued interest (which is equivalent to market)	757,994	352,553
Accounts receivable —		
• Patients' accounts	938,547	1,088,878
• Ontario Ministry of Health	2,021,426	1,982,741
• The Ontario Cancer Treatment and Research Foundation	1,638,357	797,023
• Other	1,318,984	957,341
Due from P.M.H. Trust	114,065	71,773
Inventories, at cost	587,982	665,258
Prepaid expenses	123,437	108,597
Total current assets	9,939,977	9,207,101
PROPERTY, AT COST:		
Land	3,033,365	3,033,365
Buildings	19,993,397	18,979,747
Equipment and furniture	21,587,324	20,238,270
	44,614,086	42,251,382
Less accumulated depreciation	20,701,306	18,873,482
	23,912,780	23,377,900
Construction in progress	469,248	593,033
	24,382,028	23,970,933
	$34,322,005	$33,178,034

AUDITOR'S REPORT

To the Members of The Ontario Cancer Institute:

We have examined the balance sheet of the Ontario Cancer Institute as at March 31, 1985 and the statements of operations, fund balance and changes in financial position for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests and other procedures as we considered necessary in the circumstances.

In our opinion, these financial statements present fairly the financial position of the Institute as at March 31, 1985 and the results of its operations and the changes in its financial position for the year then ended in accordance with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

Clarkson Gordon

Chartered Accountants Toronto, Canada, June 10, 1985

LIABILITIES AND FUND BALANCE	1985	1984
CURRENT:		
Accounts payable and accrued liabilities	**$ 6,119,730**	$ 5,407,455
Research grants received in advance	**77,146**	195,919
Total current liabilities	**6,196,876**	5,603,374
FUND BALANCE	**28,125,129**	27,574,660
	$34,322,005	$33,178,034

(See accompanying notes)

On behalf of the Board:

Member

Member

STATEMENT OF OPERATIONS

FOR THE YEAR ENDED MARCH 31, 1985

(with comparative figures for the year ended March 31, 1984)

	1985	1984
Revenue for patient care, research and education:		
• Ontario Ministry of Health and others for patient services	$39,651,769	$37,796,520
• The Ontario Cancer Treatment and Research Foundation	4,323,741	4,493,365
• Other granting agencies	7,204,857	6,019,698
• Sundry	2,945,730	2,153,013
	54,126,097	50,462,596
Expenses for patient care, research and education:		
• Salaries and wages	38,920,687	36,027,178
• Supplies and other operating expenses	15,066,802	13,001,305
	53,987,489	49,028,483
Excess of revenue over expenses before depreciation	138,608	1,434,113
Depreciation of buildings	498,343	474,067
Depreciation of equipment and furniture	1,329,481	1,232,805
	1,827,824	1,706,872
Excess of expenses over revenue for the year	$ 1,689,216	$ 272,759

(See accompanying notes)

STATEMENT OF FUND BALANCE

FOR THE YEAR ENDED MARCH 31, 1985

(with comparative figures for the year ended March 31, 1984)

	1985	1984
Balance, beginning of year	$27,574,660	$25,594,046
Deduct excess of expenses over revenue for the year	1,689,216	272,759
	25,885,444	25,321,287
Add grants for building alterations and equipment:		
• Ontario Ministry of Health	1,352,485	1,408,597
• The Ontario Cancer Treatment and Research Foundation	279,678	313,584
• P.M.H. Trust	426,176	310,579
• Other	181,346	220,613
	2,239,685	2,253,373
Balance, end of year	$28,125,129	$27,574,660

(See accompanying notes)

STATEMENT OF CHANGES IN FINANCIAL POSITION FOR THE YEAR ENDED MARCH 31, 1985

(with comparative figures for the year ended March 31, 1984)

	1985	1984
Sources of funds:		
• From operations		
Excess of expenses over revenue for the year	$(1,689,216)	$ (272,759)
Add depreciation not requiring an outlay of funds in the current year	1,827,824	1,706,872
	138,608	1,434,113
• Grants for building alterations and equipment	2,239,685	2,253,373
	2,378,293	3,687,486
Applications of funds		
• Fixed asset acquisitions	2,238,919	2,261,075
Increase in working capital	139,374	1,426,411
Working capital, beginning of year	3,603,727	2,177,316
Working capital, end of year	3,743,101	3,603,727
Represented by:		
• Current assets	$9,939,977	$9,207,101
• Current liabilities	6,196,876	5,603,374
	$3,743,101	$3,603,727

(See accompanying notes)

NOTES TO FINANCIAL STATEMENTS MARCH 31, 1985

1. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

(a) Basis of Ministry of Health funding — Pursuant to the Health Insurance Act the Institute receives funds from the Ministry of Health to substantially cover its operating costs. Funds are received during the year based on a total amount approved by the Ministry in respect of the fiscal year. The portion of Ministry funding applicable to operations is credited to operating revenue in the year to which the grant applies. Any surplus or deficit arising from the difference between the Institute's actual operating results for the year and the amount approved by the Ministry is retained or financed by the Institute. The portion of Ministry funding applicable to capital purchases is credited to fund balance in the year in which the expenditures are made.

(b) Other capital grants — Other grants for capital purposes are credited to fund balance as the related expenditures are made.

(c) Depreciation — Although substantially all fixed assets acquired by the Institute are financed by the Ministry of Health and The Ontario Cancer Treatment and Research Foundation, the cost of such assets is recorded in these financial statements and depreciated on a straight-line basis at the following rates:
Buildings — 2 1/2%
Equipment and furniture — 5%, 6.6%, 10% or 20%

2. TAX STATUS

The Ontario Cancer Institute is registered as a charitable organization under the Income Tax Act (Canada) and is therefore exempt from income tax and may issue tax deductible receipts to donors.

3. COMMITMENTS

The Institute in 1982 entered into an agreement to purchase radiotherapy equipment for an amount of $1,255,533 of which $367,660 had been spent to March 31, 1985. The balance is expected to be paid next year. The Ministry of Health has funded the full amount of the purchase price under a capital grant received by the Institute subsequent to the year end.

4. PENSION PLAN

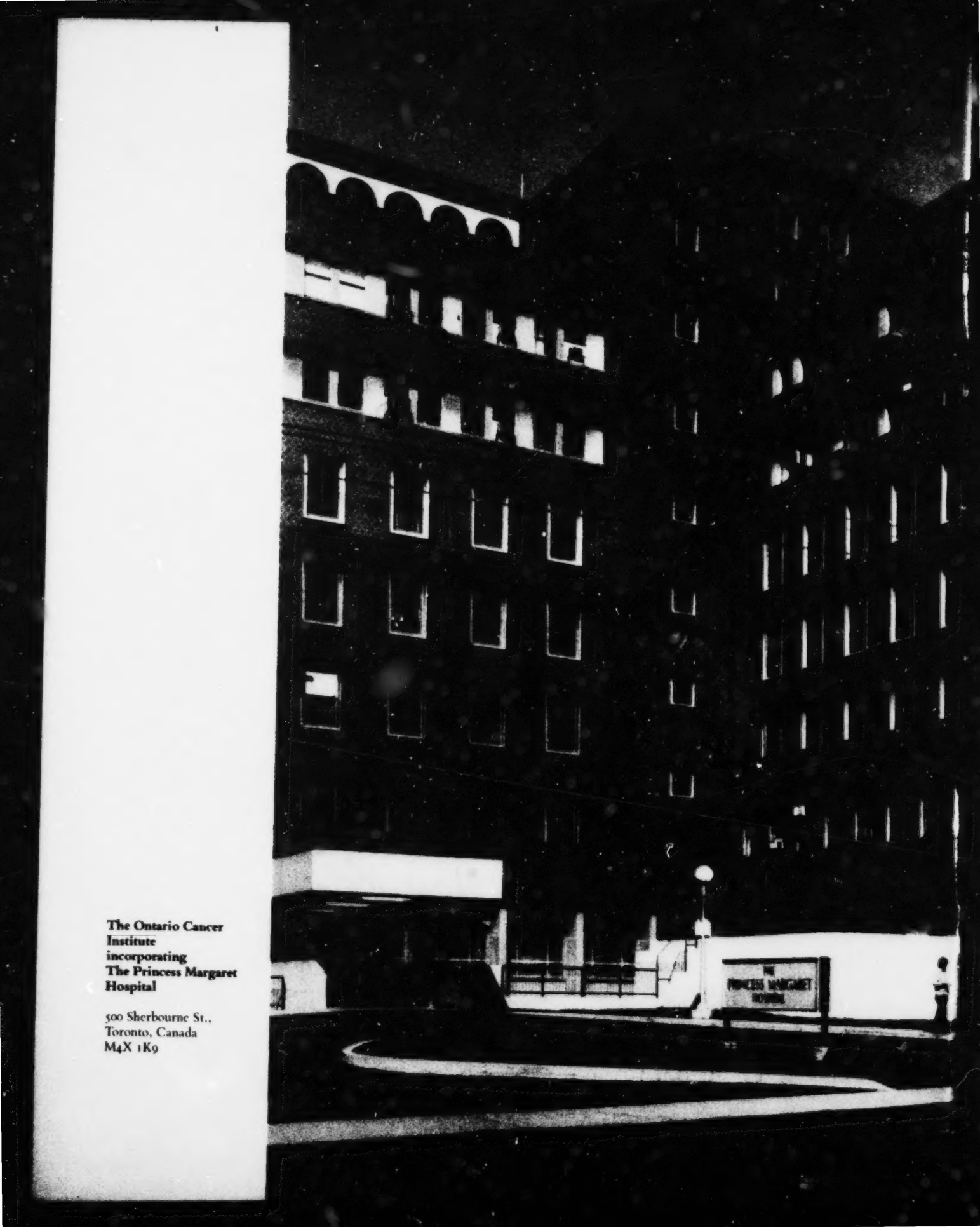
The Institute has a voluntary pension plan for its employees. Based on the most recent actuarial valuation of the plan as at July 1, 1983, there is no unfunded liability.

5. P.M.H. TRUST

P.M.H. Trust is a separate corporation without share capital and with its own board. P.M.H. Trust receives and applies funds to assist The Ontario Cancer Institute in cancer research, education and treatment. The accounts of P.M.H. Trust are not included in these financial statements. During the year, P.M.H. Trust granted $426,176 (1984 - $310,579) to the Institute for capital projects.

6. COMPARATIVE FIGURES

Certain 1984 comparative figures have been reclassified to conform to the method of presentation adopted for 1985.



The Ontario Cancer Institute
incorporating
The Princess Margaret Hospital

500 Sherbourne St.,
Toronto, Canada
M4X 1K9

POOR
QUALITY
ORIGINAL